

REMARKS

Applicant requests favorable reconsideration and allowance of the subject application in view of the preceding amendments and the following remarks.

The specification has been amended to place the subject application in better form. No new matter has been added by these changes.

Claims 45-52 are presented for consideration. Claim 45 is the sole independent claim. Claims 53-76 have been canceled without prejudice or disclaimer. Claims 45-47 have been amended to clarify features of the subject invention. Support for these changes can be found in the original application, as filed. Therefore, no new matter has been added.

Applicant requests favorable reconsideration and withdrawal of the rejection set forth in the above-noted Office Action.

Claims 45-76 were rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,696,623 to Fujie et al. in view of U.S. Patent No. 5,995,263 to Tokuda et al. Applicant submits that the cited art, whether taken individually or in combination, does not teach many features of the present invention, as previously recited in claims 45-76. Therefore, this rejection is respectfully traversed. Nevertheless, Applicant submits that claims 45-52, as presented, amplify the distinctions between the present invention and the cited art.

Independent claim 45 recites an exposure apparatus that includes an illumination optical system for illuminating a mask with light from a light source, a projection optical system for projecting a pattern of the mask being illuminated, the projection optical system having a plurality of optical elements and gas supplying means for locally supplying a gas to a

predetermined surface of one of the optical elements, which is closest to an image plane, the predetermined surface being a surface facing the image plane. The gas supplying means has a surface outlet port which is inclined with respect to the image plane so that the gas outlet port faces toward the predetermined surface of the one optical element rather than to the image plane.

Applicant submits that the cited does not teach or suggest such features of the present invention, as recited in independent claim 45.

The Examiner relies on the Fujie et al. patent for teaching an exposure apparatus for illuminating a pattern with light from a light source and for exposing a predetermined surface with light from the pattern, the apparatus including a projection optical system and a gas supplying device. Applicant submits, however, that the Fujie et al. does not at all teach or suggest supplying a gas locally to a surface of an object in the manner of the present invention, as recited in independent claim 45.

Applicant further submits that the remaining art does not cure the deficiencies noted above with respect to the Fujie et al. patent.

The Examiner asserts that the Tokuda et al. patent discloses that a gas supplying device should directly blow gas toward an optical surface of an optical element. Applicant submits, however, that in the Tokuda et al. patent, the gas supplying device 29, provided to supply a gas to the final lens surface of the projection lens, is mounted so that it faces downwardly, that is, toward the image plane, rather than toward the final lens surface. To the contrary, in the present invention, the outlet port of the gas supplying means is inclined with respect to the image plane so that it faces toward the predetermined surface of the one optical element of the projection

optical system (which is closest to the image plane), rather than to the image plane. Applicant submits, therefore, that the Tokuda et al. patent does not teach or suggest a gas outlet port that faces upwardly, that is, toward the final lens surface, rather than towards the image plane.

Accordingly, Applicant further submits that the Tokuda et al. patent likewise does not teach or suggest the salient features of Applicant's present invention as recited in independent claim 45. Therefore, that patent adds nothing to the teachings of the Fujie et al. patent that would render obvious Applicant's present invention as recited in that independent claim.

For the foregoing reasons, Applicant submits that the present invention, as recited in independent claim 45, is patentably defined over the cited art, whether that art is taken individually or in combination.


The dependent claims also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in independent claim 45. Individual consideration of these dependent claims is requested.

Applicant further submits that this Amendment After Final Rejection clearly places this application in condition for allowance. This Amendment was not earlier presented because Applicant believed that the prior Amendment placed the application in condition for allowance. Accordingly, entry of the instant Amendment, as an earnest attempt to advance prosecution and reduce the number of issues, is requested under 37 CFR 1.116.

Favorable reconsideration, withdrawal of the rejection set forth in the above-noted Office Action and an early Notice of Allowance are also requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,



Attorney for Applicant
Steven E. Warner
Registration No. 33,326

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3801
Facsimile: (212) 218-2200
SEW/eab



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APPENDIX A

IN THE SPECIFICATION:

Please substitute the paragraph beginning at page 2, line 11, and ending on page 3, line 13, with the following.

-- As regards optical elements in exposure apparatuses such as lenses or mirrors, for example, there frequently occurs adhesion of depositions on the surface of an optical element due to impurities contained in a surrounding ambience. It is known that, typically, ammonium sulfate or silicon dioxide, for example, is deposited on the surface of an optical element. The product source, inside a clean room, may be ammonia vapor produced from a concrete, sulfuric acid used for removal of a resist, sulfur oxides usually contained in an atmosphere, or silicon resin used in a wall material or floor material. Inside an exposure apparatus, on the other hand, the source may be [HMDS] hexamethyldisilazane (HMDS), for example, used as a contact enhancing agent with a resist. In order to remove these impurities contained in the air inside the clean room or in the exposure apparatus, a filter or the like may be provided in an air circulating mechanism, for example. However, there are many structural components, other than optical elements, disposed inside the exposure apparatus. Further, a gas produced from a resist may be a source of depositions. For these reasons, it is very difficult to completely remove impurity gases which cause depositions. In consideration of this, optical elements in each unit are accommodated in a

container so that they are isolated from a surrounding exposure apparatus chamber ambience, and the inside of the container is purged by a gas not containing impurities, to prevent contamination of the optical elements. --

Please substitute the paragraph beginning at page 4, line 16, and ending on page 5, line 16, with the following.

-- In these methods, a gas product from a wafer is rather conveyed to the lens surface, along the gas flow, such that sufficient contamination prevention is not attainable. Japanese Laid-Open Patent Application, Laid-Open No. [26038/1994] 260385/1994 shows a method in which an inactive gas is supplied through a supply port provided on a stage, in parallel to a wafer and, simultaneously, a gas is supplied toward the wafer from the bottom end of a projection optical system, in parallel to the optical axis. This method has paid [a] particular note to an oxygen concentration in the space from the projection optical system to the wafer, but the efficiency itself regarding contamination prevention at the bottom face of the projection optical system is not so good. Between a projection lens and the surface of a wafer, measurement light for measuring the imaging position passes. Any change in temperature or pressure of an ambience in the space through which the measurement light passes[,] leads to a measurement error, and this applies a large influence to the position adjustment for the wafer imaging position. Further, a change in temperature or pressure of the ambience is also influential to the imaging performance. For these reasons, the flow of a gas of a large flow rate or any fluctuation in

pressure or temperature causes an error of the wafer position adjustment and degradation of the imaging performance. --

IN THE CLAIMS

45. (Amended) An exposure apparatus [for illuminating a pattern with light from a light source and for exposing a predetermined surface with light from the pattern, said apparatus] comprising:

an illumination optical system for illuminating a mask with light from a light source;

a projection optical system for projecting [the pattern onto the predetermined surface] a pattern of the mask being illuminated, said projection optical system having [at least one optical element having optical surfaces] a plurality of optical elements; and

gas supplying means for locally supplying a gas to [said at least one optical element] a predetermined surface of one of said optical elements, which is closest to an image plane, the predetermined surface being a surface facing the image plane, wherein said gas supplying means [directly blows the gas toward one of the optical surfaces of said at least one optical element, which is closest to the predetermined surface, from the predetermined surface side] has a surface outlet port which is inclined with respect to the image plane so that the gas outlet port faces toward the predetermined surface of the one optical element rather than to the image plane.

46. (Amended) An apparatus according to Claim 45, further comprising a container for accommodating [said at least one optical element] the optical elements within a space being isolated from a surrounding ambience.

47. (Amended) An apparatus according to Claim 46, further comprising a cover, disposed at the predetermined surface side of said container, for suppressing diffusion of the gas supplied by said gas supplying means to the one optical [surface closest to the predetermined surface] element.

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